Loutsenko and Roubtsov Reply: The model proposed in [1] can be considered as a model describing the anomalous transport of nonrelativistic bosons in a medium with the linear dispersion law at zero temperature.

The main idea of Letter [1] is that the effective two-particle interaction between bosons switches from being repulsive to the attractive one if the velocity of collective propagation of the bosons in the medium exceeds some critical speed. This effect occurs due to different covariance of the dynamic equations that describe the nonrelativistic subsystem of bosons and the linearly dispersive medium. As a result, the boson subsystem "collapses" into a soliton wave packet above this threshold.

Note that the effect of such an anomalous propagation is the quantum one, since Bose-Einstein condensation (more exactly, occurrence of the exciton-phonon Bose condensate) is essential in our consideration.

The theory developed in [1] was applied to interpret the experiments on excitonic propagation in semiconducting crystals (Cu_20) at nonzero temperature [2]. In this series of experiments, a crystal was irradiated by laser pulses. At low intensities of the laser beam (i.e. at low concentration of the excitons), the system revealed a typical *diffusive* behavior. Once the intensity of the beam exceeded some value, the majority of particles moved together in a sharp *solitonic* packet with the ballistic velocity exceeding some critical speed. This coincides with the main result of our theory.

Although this theory yields a qualitative description of the experiments and a reasonable value for the critical velocity, the estimate of the width of the condensate at zero temperature is in a strong disagreement with experimental data [2] for the total exciton-phonon packet (at finite temperature). Indeed, we obtain [1]

$$L_{\rm ch}(N_{\rm o},\, v) \simeq 4\sqrt{\frac{\hbar^2}{m_{\rm x}\,|\tilde{\nu}_0(v)|}\,\Phi_{\rm o}^{-2}(N_{\rm o},\, v)}\,, \tag{1}$$

i.e., $L_{\rm ch} = \mathcal{F}\, a_{\rm x}$, where the large factor $\mathcal{F}$ can vary as $10^2 \sim 10^4$, and $a_{\rm x}$ is the exciton Bohr radius. Thus, the duration of the condensate can be estimated as $t_{\rm ch} \simeq 2\times(10^{-11} - 10^{-9})$ s (compare with the corresponding estimate in [3]). On the other hand, $\Delta t \simeq 5\times10^{-7}$ s was obtained experimentally [2].

This fact was pointed out by S. G. Tikhodeev in Comment [3]. In our opinion, the crucial question is whether the Bose-Einstein condensate, or, better, any macroscopically occupied coherent mode, exists inside the exciton-phonon packet at $T < T_c$. If yes, one can ask, for example, how many excitons form the coherent core of the packet, and the value of $N_{\rm o}(T)/N_{\rm tot}$ has to be estimated at $T < T_c$.

Indeed, localized moving solutions for the exciton concentration $n(x,t)$ can be obtained within classical models (see, e.g., [4]), in which the Bose-Einstein condensate of excitons is absent and the excitonic cloud is dragged by the sound wave of a large amplitude created under the action of the strong laser pulse.

Here, we list several facts that support the idea that the localized excitonic condensate has to be taken into account to interpret experimental data [2].

- Experiments are conducted at nonzero temperature, and the excitonic condensate (if appears) can constitute of a relatively small fraction of the total number of particles. We considered the system bosons + medium at zero temperature. Experimental data, however, show strong dependence of the packet length on the temperature (at least, an order of magnitude in the range of $2-5\,\mathrm{K}$). Thus, no conclusion can be made until our theory is extended to nonzero temperatures or experiments are conducted at much more lower temperatures.

- All the results on nonlinear interaction between two packets [2] point out to a kind of coherent interaction. This is expected within our quantum model of the moving exciton-phonon droplet with the "Bose-nucleus". It is an open question whether such a behavior can be the case within any classical model.

- If, according to experiments, the phonon source is generated at a surface by a strongly absorbed radiation, the phonon wind [4] does not effect strongly the excitons with a density just below the threshold one, and no appreciable effect is detected. On the contrary, the injection of cold excitons distributed throughout the volume leads to the appearance of a localized packet in the above conditions.

We believe that the future theory needs both the exciton-phonon condensate and the proper incorporation of non-condensed excitons and phonons. It can be tested by further experiments as well. For example, one can set the crystal geometry in such a way that the sound wave of the phonon wind theory can be dumped out, and only the coherent part of the packet (if exists) will continue to propagate.

In conclusion, we note that the phonons play a crucial role in almost all current models aimed to explain or predict coherent behavior of excitons in semiconductors, see, f.ex., [5],[6],[7]. The fact that our simple model fails to predict the width of the packet correctly does not mean our approach is wrong. Indeed, one has to take into account the thermal excitons (e.g., the weak tail that is always observed behind the soliton [2]) and the thermal phonons of the crystal to make the model with *condensate* more realistic.

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